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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Toshiaki Hongo

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EXAMINER

ARANCIBIA, MAUREEN GRAMAGLIA

ART UNIT

PAPER NUMBER

1792

MAIL DATE

DELIVERY MODE

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 09/815,305	Applicant(s) HONGO ET AL.	
	Examiner Maureen G. Arancibia	Art Unit 1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 August 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 46-65 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 46-65 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. **Claims 61, 62, 64, and 65 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.**

Claims 61 and 64 recite the limitation "the plasma chamber" in Line 3 of each claim. There is insufficient antecedent basis for this limitation in the claim. For the purposes of the following examination on the merits, this recitation has been interpreted as referring to the process chamber. Claims 62 and 65 are rejected due to their dependence on Claims 61 and 64, respectively.

Claim Rejections - 35 USC § 102 / 35 USC § 103

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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5. **Claims 46, 48, 51-53, 55, 58, and 59 are rejected under 35 U.S.C. 102(b) as anticipated by JP 01-274398A to Nakahigashi et al. or, in the alternative, under 35 U.S.C. 103(a) as obvious over Nakahigashi et al. in view of JP 11-067737A to Koshimizu (the publication of Japanese Patent Application 09-231751). The following rejection refers to the Figures and English Translation of Nakahigashi et al. The following rejection also refers to U.S. Patent 6,162,323, which issued from the U.S. counterpart application to Japanese Patent Application 09-231751, as an English language equivalent to JP 11-067737A to Koshimizu.**

In regards to Claims 46, 51, 53, and 58, Nakahigashi et al. teaches a plasma processing apparatus (Figure 1) for applying a plasma process to a substrate 7, the plasma processing apparatus comprising: a process chamber (the interior of the plasma processing apparatus of Figure 1) in which the substrate 7 is subject to the plasma process; a plasma source (waveguide 3, such as for microwaves; coils 4; Figure 1) that generates plasma in the process chamber; a gas introducing portion (Figure 1) configured to introduce a gas into the process chamber; and an exhaust outlet 16 (Figure 1) that evacuates the gas from the process chamber; wherein the gas introducing portion includes first and second gas introducing portions configured to supply a first gas and a second gas, wherein each of the first and second gas introducing portions includes an inlet port 14, an outlet port 15, a gas passage 12 connected to the respective inlet and outlet ports, and a plurality of gas nozzles (apertures in respective plates 13) connected to the respective gas passage; and wherein a gas exhaust line is directly connected to each of the respective outlet ports 15

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of the respective gas introducing portions. (Figure 1; English Translation, at least pages 5-7)

A review of the English Translation of Nakahigashi et al. indicates that Nakahigashi et al. appears to be silent as to whether each of the exhaust outlet 16 and the two respective outlet ports 15 are connected to respective vacuum devices, as recited in Claims 46 and 51, or whether the two respective outlet ports 15 are connected to bypass lines that connect the outlet ports to a common vacuum device that is connected to exhaust outlet 16, as recited in Claims 53 and 58.

Nevertheless, Examiner argues that it is implicit in the known teachings of Nakahigashi et al. that *either* independent vacuum devices are provided, as recited in Claims 46 and 51, *or* that a common vacuum device is provided, with bypass lines connecting the respective outlet ports 15 to the common vacuum device, as recited in Claims 53 and 58. In other words, Examiner argues that Nakahigashi et al. anticipates *at least either* Claims 46 and 51 *or* Claims 53 and 58.

In so far as it cannot be determined at this time which of these two claimed arrangements is anticipated by Nakahigashi et al., an alternative rejection of the claims is made as being obvious under 35 U.S.C. 103 over Nakahigashi et al. in view of Koshimizu.

Koshimizu teaches that the outlet 602 of a processing chamber 134 and an outlet 608 of a gas introducing portion 132 can be connected to a common vacuum device 606, with a bypass line connecting the outlet 608 of the gas introducing portion 132 to the vacuum device (Figure 4; Column 10, Lines 13-30); or alternatively, that the outlet

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602 of a processing chamber 134 and an outlet 608 of a gas introducing portion 132 can be connected to independent vacuum devices 902, 904, respectively (Figure 7; Column 12, Lines 30-53).

It would have been obvious to one of ordinary skill in the art to modify the apparatus taught by Nakahigashi et al. to have either a common vacuum device shared by all the outlets, as recited in Claims 53 and 58, or to have independent vacuum devices connected to each of the outlets, as recited in Claims 46 and 51, as taught by Koshimizu. The motivation for providing a common vacuum device, as taught by Koshimizu (Column 10, Lines 61-64), would have been to have an apparatus of decreased cost. The motivation for providing independent vacuum devices, as taught by Koshimizu (Column 11, Lines 8-11), would have been to have the ability for quicker evacuation of the processing chamber or gas introducing portion, thereby improving the throughput.

In regards to Claims 48 and 55, Nakahigashi et al. teaches that the gas introducing portion is of a showerhead type having a surface facing the substrate 7 and provided with a plurality of holes. (Figures 1 and 2)

In regards to Claims 52 and 59, Nakahigashi et al. teaches that a diameter of the respective outlet ports 15 is larger than a diameter of the gas nozzles (apertures in respective plates 13). (Figures 1 and 2)

6. Claims 47, 49, 54, 56, and 60-65 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakahigashi et al., or alternatively, over Nakahigashi et al. in

view of Koshimizu, as applied to claims 46 and 53 above, and further in view of U.S. Patent 5,614,055 to Fairbairn et al.

The teachings of Nakahigashi et al. and Koshimizu were discussed above.

In regards to Claims 47, 49, 54, and 56, Nakahigashi et al., or alternatively, the combination of Nakahigashi et al. and Koshimizu, do not expressly teach that the gas introducing portions and gas passages are formed in an annular ring shape.

In regards to Claims 60 and 63, Nakahigashi et al., or alternatively, the combination of Nakahigashi et al. and Koshimizu, do not expressly teach that the plurality of gas nozzles extend radially around a perimeter of the process chamber.

In regards to Claims 61, 62, 64, and 65, Nakahigashi et al. teaches that the gas passage 12 is provided between the inlet and outlet ports and the gas nozzles, as discussed above. (Figure 1)

Nakahigashi et al., or alternatively, the combination of Nakahigashi et al. and Koshimizu, do not expressly teach wherein the gas passage is provided outside an interior of the process chamber, specifically in an inner wall of the process chamber.

Fairbairn et al. teaches that a gas introducing portion with a gas passage 100 is formed in an annular ring shape in an inner wall of a process chamber 102, wherein a plurality of gas nozzles 106 extend from the gas passage 100 radially around a perimeter of the process chamber. (Figure 8; Column 9, Lines 20-40)

It would have been obvious to one of ordinary skill in the art to modify the teachings of Nakahigashi et al., or alternatively, the combination of Nakahigashi et al. and Koshimizu, to form the gas introducing portions and gas passages in an annular

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ring shape, with the gas passage formed in an inner wall of the process chamber, and the plurality of gas nozzles extending from the gas passage radially around a perimeter of the process chamber, as taught by Fairbairn et al. The motivation for making such a modification, as taught by Fairbairn et al. (Column 8, Lines 20-40), would have been that forming the gas introducing portion, gas passage, and gas nozzles in such a way solves the problem of overheating of the gas introducing means, since the chamber wall can act as a heat sink for the gas nozzles, and also that the nozzles present a small cross-section to the plasma, and thus little loss of plasma density occurs.

7. Claims 50 and 57 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakahigashi et al., or alternatively, over Nakahigashi et al. in view of Koshimizu, as applied to claims 46 and 53 above, and further in view of U.S. Patent Application Publication 2002/0011215 to Tei et al.

The teachings of Nakahigashi et al. and Koshimizu were discussed above.

In regards to Claims 50 and 57, Nakahigashi et al., or alternatively, the combination of Nakahigashi et al. and Koshimizu, do not expressly teach that the plasma source includes a flat antenna having a plurality of slits.

Tei et al. teaches that a plasma source includes a flat antenna 111 having a plurality of slits 111S (Figures 1 and 3).

It would have been obvious to one of ordinary skill in the art to modify the plasma source of Nakahigashi et al., or alternatively, the combination of Nakahigashi et al. and Koshimizu, to include a flat antenna having a plurality of slits, as taught by Tei et al. The motivation for doing so, as taught by Tei et al. (Paragraphs 76-80), would have

been to provide a microwave supply plane to adjust the distribution of microwaves transmitted from the waveguide to the processing chamber, and thereby to adjust the plasma intensity for surface treatment.

Response to Arguments

8. Applicant's arguments, see Pages 10-11 of the Remarks filed 16 August 2007, with respect to the rejection(s) of claim(s) 47, 49, 54, and 56 under 35 U.S.C. 103(a) as being unpatentable over Nakahigashi et al., or alternatively, over Nakahigashi et al. in view of Koshimizu, as applied to claims 46 and 53, and further in view of McMillin et al., have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of the newly discovered reference U.S. Patent 5,614,055 to Fairbairn et al.

9. Applicant's remaining arguments filed 16 August 2007 have been fully considered but they are not persuasive.

Specifically in regards to Applicant's argument that in the apparatus of Nakahigashi, the plasma is generated in a separate plasma generating chamber, and not generated in the process chamber where the substrate is located, as required by Claim 46, Examiner must disagree. While the plasma may be struck by microwave power in the upper portion of the plasma processing apparatus of Nakahigashi, the plasma still diffuses down to the plasma processing region where the substrate is located, and thus is "generated" in the plasma processing region where the substrate is located. Moreover, Claim 46 merely broadly recites that the process chamber is the chamber in which the substrate is subject to the plasma process. Thus, the entire

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interior of the plasma processing apparatus of Nakahigashi may be considered to meet the recitation of the process chamber in Claim 46. The plasma is certainly generated in the interior of the plasma processing apparatus, and thus in the plasma chamber, as broadly recited in the claims. It has been held that during patent examination, the pending claims must be "given the broadest reasonable interpretation consistent with the specification." Applicant always has the opportunity to amend the claims during prosecution, and broad interpretation by the examiner reduces the possibility that the claim, once issued, will be interpreted more broadly than is justified. *In re Prater*, 415 F.2d 1393, 1404-05, 162 USPQ 541, 550-51 (CCPA 1969).

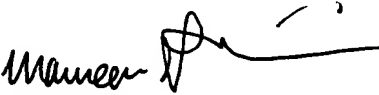
Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Maureen G. Arancibia whose telephone number is (571) 272-1219. The examiner can normally be reached on core hours of 10-5, Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571) 272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.


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